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Annual Net Returns to Cover Crops in Iowa

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Keywords
Cover crops, partial budget, net returns, cereal rye, Iowa

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Abstract

Despite the active promotion of cover crops as a key conservation practice, their adoption is very limited. We developed a series of partial budgets based on a statewide survey of Iowa farmers to evaluate the changes in net returns resulting from the incorporation of cover crops into a corn or soybean production system. The average net returns to cover crops use for farmers that did not use cover crops for grazing livestock or forage were consistently negative across different planting and termination methods, tillage practices, and experience levels. Only farmers that used cover crops for grazing livestock or forage, and received cost-share payments tended to derive net positive returns from cover crops use. Our results can be used as benchmarks for current or potential cover croppers, and for ground-truthing agricultural and conservation policy design.

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Q12, Q18

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Introduction

Despite the soil health and environmental benefits associated with cover crops (Kaspar & Singer 2011; Chatterjee 2013; Miguez 2016), the inclusion of cover crops in the Iowa Nutrient Reduction Strategy (2014) as one of the practices with the greatest potential for nitrate-N reduction, and the array of existing cost-share programs to defray the cost of adopting the practice, the number of acres in cover crops in Iowa is low. Out of 30 million acres of farmland in Iowa, the top state in corn production and the second state in soybean production in the United States, the Natural Resource Conservation Service (NRCS) (2012) estimated that only 100,000 acres were planted to cover crops in 2012. Five years later, the same agency (NRCS 2017) estimated that Iowa farmers planted more than 353,000 acres of cover crops in the fall of 2016 with financial assistance from the Iowa Department of Agriculture and Land Stewardship (through the Iowa Water Quality Initiative, state cost-share, and local watershed project) and federal conservation programs (through the Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP), and Regional Conservation Partnership Program (RCPP)). Rundquist and Carlson (2017), using satellite imagery, report that cover crops were incorporated into corn and soybean rotations in only 2.65% of Iowa cropland in 2015.

Lack of familiarity with novel approaches in agriculture can inhibit adoption of conservation practices (Nassauer, et al. 2011). Across four surveys (Watts and Myers, 2013, 2014, 2015, and 2016), farmers reported the greatest challenges to using cover crops were establishment, time or labor required and increased management, and species selection. Farmers' perceptions that cover crops are costly was also found to be a major barrier to their adoption: 74% of the respondents to the Iowa Farm and Rural Life Poll (Arbuckle, 2015) reported that

potential economic impacts had moderate to very strong influence on changes in their management practices, and 57% agreed with the statement that "pressure to make profit margins makes it difficult to invest in conservation practices". Roesch-McNally, et al. (2017) found that despite having successfully planted cover crops, farmers tended to believe that greater economic incentives would be needed to spur more widespread adoption of the practice.

Only a few studies have analyzed the changes in farm costs and returns due to cover crop adoption in U.S. row crop agriculture. Reddy (2001), Mahama, et al. (2016), and Roberts, et al. (1998) used field experimental data to assess the economic returns to cover crops in Mississippi, Kansas, and Tennessee, respectively. However, conclusions from economic evaluations based on field experiments might not apply to real farms where management practices do not follow an experimental design. Roberts and Swinton (1996), using actual data from 15 corn producers in Michigan, concluded that cover crops do not significantly reduce net returns. Snapp, et al. (2005) and Roesch-McNally et al. (2017) based on focus group discussions provide qualitative summaries of the potential benefits and costs from cover crops to Michigan potato farmers and Iowa row crop farmers, respectively. Finally, Plastina et al. (2018) developed partial budgets with survey data from U.S. Midwest row crop farmers that managed production systems with and without cover crops, and concluded that the average net returns to cover crops terminated with herbicides followed by corn was negative, but the average net return to cover crops terminated with herbicides followed by soybeans was positive. Two major limitations of the analysis in Plastina et al. (2018) were the small sample size and the geographical dispersion of the survey respondents: results were based on 79 farms across 11 states.

The present study provides a robust analysis of the net returns to cover crops in Iowa across several combinations of cover crop mixes, termination practices, and geographical

locations (agricultural districts), by applying the methodology developed by Plastina et al. (2018) to a survey implemented through the Upper Midwest regional office of the National Agricultural Statistics Service (NASS). The statewide focus of the survey and the larger number of responses make the findings from the present study more appealing than those from Plastina et al. (2018). The average net returns to cover crops use for farmers that did not use cover crops for grazing livestock or forage were consistently negative. Only farmers that used cover crops for grazing livestock or forage, and received cost-share payments tended to derive net positive returns from cover crops use.

The rest of the article is organized into a methodological section, followed by a results section, and a concluding section briefly discussing the implications of our findings for farm operators and policy makers.

Methodology

Survey Questionnaire

The survey instrument was designed based on focus group discussions with farmers with at least three years of experience with cover crops in Iowa, Minnesota and Illinois, and modified based on a follow up pilot survey implemented among focus group participants (Plastina et al. 2018). The final survey questionnaire consisted of 192 questions, organized in seven sections: basic farm information, cover crop planting, cover crop termination, revenues and costs, tillage, previous rotation, and perceptions about cover crops.

The strategy to identify differences across production systems with and without cover crops was to ask respondents to characterize the production practices implemented in their production system with cover crops first, and then to ask them whether such characteristics also applied to their production system without cover crops. Such strategy is deemed better than the

traditional way of asking farmers about the dollar values of their perceived changes in costs and revenues associated with cover crops, because (1) all respondents are exposed to the same exhaustive list of possible changes in practices (instead of just a few broad categories that can be interpreted by different respondents to include fewer or more concepts), and (2) their attention is directed toward both practices that generate changes in cash flows and opportunity costs (instead of only in the former).

Cash costs (including seed costs, fertilizer costs, herbicide costs, and custom hired work) and revenues (cost-share payment received through local, state or federal programs such as EQIP, CSP, or RCPP) were directly identified through questions that asked producers to report dollar values. To identify own machinery costs, the survey asked about the type of machinery used, and associated costs were derived from a budgeting tool developed specifically for cover crops by Cartwright and Kirwan (2014). To estimate the opportunity costs of added management due to the use of cover crops, the survey asked for an estimate of additional management hours, assigned an hourly rate of $15 and divided that total by the total cover crop acres planted in 2015. To estimate changes in revenue due to yield differences across fields with and without cover crops for the same farmer, prices of $4 per bushel of corn and $10 per bushel of soybeans were used in the calculations.

Survey Sample

A stratified random sample of 1,250 operators in the state of Iowa was identified by NASS based on the population of farmers that reported planting at least 10 acres of cover crops in rotation with row crops in farms of at least 50 cropland acres in size in the 2012 U.S. Census of Agriculture. Row crop farming rotations were defined for this study to include corn, soybean, and wheat (i.e., excluding fruits, vegetables, tree nuts, greenhouse, nursery and floriculture

production, tobacco, cotton, etc.). The sampling strategy accounted for farm sizes (small, medium, and large), and geographical coverage across the state.

The survey questionnaire was mailed on February 1, 2017, and a second questionnaire mailing was sent to all non-respondents by mid-February. Finally, telephone follow-ups of non-respondents were conducted.

Despite its geographical coverage, and the detailed criteria followed in developing the random sample by NASS, the sampling framework (which excluded operators who adopted cover crop after 2012, and included operators who discontinued the use of cover crops or retired after 2012) does not allow us to make any inferences about population totals or averages. However, our results are the best estimates of net returns to cover crops available in the literature, both due to the partial budget approach used in the calculations and the sample size of non-experimental field data.

A total of 674 responses were received, amounting to a 54% response rate, of which 440 corresponded to operators who had planted cover crops, and 234 corresponded to operators with no cover crops experience.[1] The data used for the present study correspond to the subset of operators who planted cover crops in 2015 in some of their acres (but not all), and planted the same cash crop in 2016 both in acres following cover crops and in acres without cover crops. A total of 233 responses distributed across all agricultural districts (Figure 1) were left after excluding responses from: (1) farmers with no cover crops experience; (2) farmers that did not plant cover crops in 2015; (3) farmers that planted cover crops in 2015 on all their acres; (4) farmers that in 2016 planted a different cash crop on acres following cover crops than on acres

[1] We believe that the high number of respondents with no experience with cover crops (35% of all respondents) is due to the dynamics of the rental cropland market and to a lesser extent the generational change of operators in Iowa.

left fallow during winter; and (5) incomplete responses. This selection process reduces the sample size, but improves the validity of the results by focusing on the changes in costs and revenues associated with cover crop use controlling for the farm manager effect and the macroeconomic conditions prevalent in 2015-2016.

Partial Budgets

Partial budgets capture the net annual economic benefit or loss associated with the use of cover crops by identifying and monetizing the differences in management practices across production systems with and without cover crops (Kay, Edwards, and Duffy, 1994). For each farm operator, expenses and revenues in his or her production system with cover crops are compared against expenses and revenues in his or her production system without cover crops. The main sources of changes in revenue due to cover crops use are changes in the value of production of the following cash crop, cost-share payments received by farmers, savings in livestock feed costs from grazing cover crops, and the net returns to harvesting cover crops' biomass for forage.

The major sources of changes in costs due to cover crop use can be split into planting, termination, and other costs. Planting costs depend on seed costs, planting method (drilling, aerial, broadcasting, or other), and whether the planting was done by the operator or custom hired. Termination costs depend on the method used to terminate cover crops (herbicide, tillage, winter kill, mowing, or other), whether the work was done by the operator or custom hired, and whether the method is differentially applied to acres with cover crops but not on acres without cover crops. When the method used to terminate cover crops is part of the typical spring management practices used by a farmer across all acres (with and without cover crops), the extra costs to terminate cover crops tend to be lower than when the termination method is only applied on acres with cover crops. For example, if an operator applies one pass of pre-plant burn down

across all acres (with and without cover crops), but the herbicide dose for the acres with cover crops is more concentrated than in the acres without cover crops, then the termination costs used in the partial budget for this operator amount only to the difference between the cost of the more concentrated herbicide mix and the cost of the less concentrated mix per acre. If another operator does not apply a pre-plant spring treatment in the acres without cover crops, but applies one field pass of herbicides to terminate cover crops, then the entire cost of the herbicide mix plus the application cost (fixed and variable costs of machinery use and operator's time) is included in the partial budget for that operator.

Other sources of changes in costs targeted by the survey questionnaire include cash crop seed costs; cash crop planting costs (excluding seeds); nitrogen (N), phosphorous (P), potassium (K), manure, insecticide, fungicide, and soil testing costs; costs to repair soil erosion; opportunity cost of extra management time, and changes in cash rent paid due to cover crop use.

Results

The average area planted to cover crops in 2015 by our survey respondents amounted to 268 acres (Table 1). Respondents had, on average, 7.9 years of experience with cover crops. However, half (two-thirds) of them had 5 (8) years of experience or less. The cumulative number of cover crop acres planted through all the years of experience averaged 870 acres per operator. Eighty-three percent of the respondents operated farms between 200 and 2,000 acres in size, and the median farm size was 500-999 acres (Table 2). The most frequently planted cover crop among our survey respondents was cereal rye (typically by itself, and to a lesser extent mixed with oats), followed in a distant second place by annual ryegrass. The most extensively used

planting method[2] was drilling (76%), followed by aerial and broadcast seeding (19% and 4%, respectively). Two-thirds of the respondents used herbicides to terminate cover crops, and the other third chose tillage, mowing, or winter kill as the termination method. Three in 5 respondents planted corn[3] for grain or seed following cover crops, while the other cover croppers typically planted soybeans[4] in 2016.

The partial budget results are presented in sets to sequentially discuss the overall net returns to cover crops in Iowa, and the effects of experience, tillage method, planting method, and termination method on net returns to cover crops. In order to obtain robust estimates of each of the items included in the partial budgets, all valid responses were used in the calculation of the reported summary statistics: mean, median, and range. The downside to this approach is that subtotals and totals do not reflect the actual changes in costs, revenues, or net returns for any producer in particular, but instead reflect the measures of central tendency across sources of changes in net profits.

Net Returns to Cover Crops Terminated with Herbicides

The average calculated changes in net returns stemming from the use of cover crops terminated with herbicides, across all cover crops, all planting methods, and all tillage methods were positive: $8.59 per acre for cover crops followed by corn (Table 3) and $14.25 per acre for cover crops followed by soybeans (Table 4). However, those averages include in their calculations the cost savings in livestock feed from farmers that use cover crops for grazing or forage: an average

[2] Nearly 2 in 5 respondents hired custom planting work for their cover crop (Table 1), and most of the custom hired planting consisted of aerial seeding (55%), followed by drilling (25%), or broadcast seeding (16%).
[3] Fifty-one percent of the respondents who planted corn in 2016 following cover crops had also planted corn in 2015.
[4] Seventeen percent of the respondents who planted soybeans in 2016 following cover crops had also planted soybeans in 2015.

of $35 per acre for cover crops followed by corn across 9 farms, and $32.54 per acre for cover crops followed by soybeans across 13 farms. When those cost savings in livestock feed are excluded from the calculations, the resulting changes in net returns average losses of $26.41 for cover crops followed by corn, and $18.29 for cover crops followed by soybeans.[5] Furthermore, the net returns to cover crops in the absence of both savings on livestock feed and cost-share payments[6] average net losses of $48.82 for cover crops followed by corn, and $38.42 for cover crops followed by soybeans. Finally, the average reduction in yields following cover crops (comparing yields across a field with cover crops and another similar field without cover crops operated by the same farmer) was 2 bushels for corn, and 0.1 bushel for soybeans. Although the median yield differences were null in Tables 3 and 4, the same qualitative results are derived when analyzing median changes instead of average changes in net returns due to cover crops use.

The major cost drivers in Tables 3 and 4 are planting costs, which add up to $33 per acre, composed in nearly equal parts by seed costs and planting costs (excluding seeds). It is interesting to note that the reported rates paid to hire custom planting of cover crop seeds come very close, on average, to the calculated costs of using farmers' own planting machinery based on Cartwright and Kirwan (2014).

Termination costs depend on whether the operator sprays all his or her acres with herbicides as part of the pre-plant treatment. About 80% of the farms in Tables 3 and 4 applied a pre-plant burn down across all their acres, and their extra herbicide costs (on top of the typical pre-plan burn down) to terminate cover crops averaged less than $1 per acre. The reported extra

[5] Similar results apply when comparing the partial budgets for cover crops followed by corn (soybeans) calculated across farmers that used the cover crop biomass for livestock grazing or forage, against the partial budgets for cover crops followed by corn (soybeans) calculated across farmers that did not use the cover crop biomass for livestock grazing or forage: $18.15 versus -$29.15 ($20.74 versus -$21.65).
[6] Note that less than half of the farms in Tables 3 and 4 received cost-share payments.

termination costs for these farmers were related to higher concentrations of active ingredients, or in some cases an extra field pass when the first herbicide application was not effective to fully terminate the cover crop. However, note that the median extra termination costs for this group of farmers are null in Tables 3 and 4.

For the minority of farmers that do not apply herbicides as part of their pre-plant program, termination of cover crops with herbicides represent a major additional expense: $16.82 for cover crops followed by corn, and $18.54 for cover crops followed by soybeans, on average. Furthermore, for the subset of farmers that custom hire the termination of cover crops with herbicides, the average custom rate paid is nearly three times the cost of using their own sprayers.

Finally, while farmers who planted cover crops followed by corn experienced, on average, small savings in nitrogen, manure, insecticide, fungicide, soil testing, soil repair costs, and cash rents due to cover crops use, some farmers experienced large cost savings and others experienced increases in those categories (see the ranges in Tables 3). However, the median change in cost in each and all "other costs" category was null. Similarly, the average changes in other costs for operators who planted cover crops followed by soybeans were small, and the median changes were null (Table 4).

Net Returns to Cover Crops by Years of Experience

In order to explore the relationship between years of experience with cover crops and net returns, we developed partial budgets across all cover crop species terminated with herbicides and followed by corn production, across all planting methods, and all tillage methods for operators with: (a) up to 3 years of experience (Table 5); (b) 4 to 9 years of experience (Table 6); and (c) 10 or more years of experience (Table 7). While the average yield drag on corn production due to

cover crops was smaller for farmers in (b) than for farmers in (a) (-0.1 bushels versus -5 bushels), and farmers in (c) experienced an average 0.5 yield increase due to cover crops, the net returns to cover crops excluding savings in livestock feed due to grazing or forage were negative for all experience levels. The average changes in net returns due to cover crop use followed by corn for operators in (a), (b), and (c) amounted, respectively, to -$37.12 (Table 5), -$18.59 (Table 6), and -$14.97 (Table 7).

A comparable analysis for cover crops followed by soybeans yields similar qualitative and quantitative results. The average changes in net returns due to cover crops use followed by soybeans excluding savings in livestock feed due to grazing or forage for operators with up to 3 years of experience, with 4 to 9 years of experience, and with 10 or more years of experience amounted, respectively, to -$24.36 (Table 8), -$11.70 (Table 9), and -$21.04 (Table 10). An important difference between Tables 8-10 and Tables 5-7 from the agronomic (although not from the economic) standpoint is that while the average corn yield drag from cover crops declined with experience, the opposite trend was observed in the average soybean yield drag from cover crops. The average change in soybean yields due to cover crops use was 0.43 bushels for farmers with up to 3 years of experience, 0.25 bushels for farmers with 4 to 9 years of experience, and -0.09 bushels for farmers with 10 or more years of experience.

Net Returns to Cereal Rye (followed by Corn) by Tillage Practices

In order to explore the relationship between tillage practices and net returns to cover crops use, we developed partial budgets for cereal rye terminated with herbicides and followed by corn, across all planting methods, for no-till (Table 11), reduced-till (Table 12), and conventional- or vertical-till (Table 13) operations. The number of respondents using no-till practices is almost twice the number of respondents using reduced-till, conventional- or vertical-till.

While the three partial budgets have similar average planting costs for cereal rye, they differ in the average costs to terminate cereal rye. Those differences are driven by the extra labor hours required to terminate cereal rye with herbicides among farmers that apply a pre-plant burn down in all acres; and the custom rate paid by farmers that hire custom sprayers to terminate the cereal rye. The median (which is less affected by extreme values than the average) change in total costs in the no-till budget is similar to the change in total costs in the reduced-till budget ($34.83 and $33.85, respectively), but lower than in the conventional-till budget ($46.26). Furthermore, the median cost-share payments received by reduced-till farmers ($27.00) were higher than the corresponding payments received by no-till, and conventional-till farmers ($20.00 and $17.50, respectively). Consequently, the net losses from cereal rye use (excluding savings in livestock feed from grazing or forage) were the smallest for reduced-till operations (-$6.80), followed by no-till operations (-$14.83), and conventional-till operations (-$28.76).

Net Returns to Cover Crops by Planting Method

The net returns for alternative planting methods (drilling and aerial seeding) for cover crops were calculated across all cover crop species for no-till operations.[7] The average changes in costs due to cover crops use followed by corn were similar across planting methods: $40.55 for operations using drills (Table 14), and $42.59 for operations using aerial seeding (Table 15). In both partial budgets, the average change in yields due to cover crop use was negative (around 3 bushels per acre), and nearly one third of the operators received cost-share payments. The average net losses due to cover crops use followed by corn (excluding savings in livestock feed from grazing or

[7] The partial budgets for other planting methods are not reported because the number of observations was too small (5 or fewer observations).

forage) was slightly lower in operations drilling cover crop seeds (-$26.99) than in operations using aerial seeding (-$34.53).

The average changes in costs due to cover crops in rotations followed by soybeans were similar across planting methods: $37.45 for operations using drills (Table 16), and $39.12 for operations using aerial seeding (Table 17). Contrary to the changes in corn yields observed in Tables 14 and 15, average changes in soybean yields are positive for both panting methods: 0.28 extra bushels in fields where cover crops were planted with drills (Table 16), and 0.50 extra bushels in fields aerial seeded (Table 17). A larger proportion of farmers using aerial seeding received cost-share payments than of farmers using drills (65% versus 38%), but the average payments were similar: $18.55 (Table 17) and $16.70 (Table 16). The average net losses due to cover crops in rotations followed by soybeans (excluding savings in livestock feed from grazing or forage) were slightly lower[8] in operations using aerial seeding (-$15.58, Table 17) than in operations using drills (-$17.95, Table 16). Note that the calculated net losses from cover crops followed by soybeans are, on average, smaller than the net losses from cover crops followed by corn.

Net Returns to Cover Crops by Termination Method

The net returns for alternative termination methods (herbicide application and tillage) for cover crops planted using drills and followed by corn were calculated across all cover crop species for operations using conventional- or vertical-till. In order to avoid large biases in the average measures caused by extreme values among few observations, the following discussion focuses only on median (instead of average) values. The median cost of planting cover crops using drill

[8] The conclusion is the opposite if median instead of average net losses are used in the comparison, but the medians are within a $1.50 per acre of each other.

planters is slightly higher for operations that used herbicide termination than for operations that used tillage to terminate cover crops: $33.50 (Table 18) and $28.51 (Table 19), respectively. While the median extra cost to terminate cover crops was null for those farmers that applied the termination method to all their acreage (with and without cover crops) as part of the spring pre-plant soil conditioning, it amounted to $15.54 for farmers that only applied herbicides in spring to their acres with cover crops (Table 18). The resulting net losses due to cover crops (excluding savings in livestock feed from grazing or forage) were slightly lower for operations using tillage than for operations using herbicides as the selected termination method: -$13.01 (Table 19) and -$20.61 (Table 18).

Conclusions

The partial budgets presented in this article serve as an assessment of the annual economic returns to adding cover crops into corn and soybean production systems in Iowa, across different planting and termination methods, tillage practices, and levels of experience with cover crops. Net returns are consistently negative across all partial budgets for farmers that do not use cover crops for grazing livestock or forage. This finding might explain the low rate of adoption of cover crops across the state of Iowa, despite the variety of cost-share programs available to promote the practice.

Farmers who are able to use cover crops for grazing livestock or forage typically derive positive net returns to cover crops if they also receive cost-share payments. When cost-share payments are excluded from the calculations, average net returns for all groups of farmers (including those that benefit from the cover crop-livestock interaction) become negative. Therefore, while cost-share payments are typically insufficient to cover all private costs associated with cover crop use, they are a critical incentive to support this practice.

This study suffers from several limitations related to the self-selection bias of survey respondents and the potential unrepresentativeness of the sample. However, it provides a variety of partial budgets based on field data (instead of experimental plots) from farmers that manage row crop production on acres with cover crops and on acres with no cover crops, that can be used as benchmarks for current and potential cover croppers, as well as ground-truth references for agricultural and conservation policy design. The results of the present study (particularly those comparing net returns across different levels of experience with cover crops), in conjunction with a lack of market valuations for actual soil health (rather than fixed soil quality indexes such as the CSR2 (Burras et al., 2015)), suggest that the necessary conditions to expand the practice according to the Iowa Nutrient Reduction Strategy (2014) are currently missing. Although incipient initiatives are discussing the path towards voluntary markets to monetize soil health (Noble Research Institute 2018), market valuations for actual soil health might take several years or even decades to develop at a large scale. Potential measures to improve the economic viability of cover crops without increasing government transfers to cover croppers include (1) the development of a more competitive market for cover crop seeds (offering high quality seed adapted to local conditions, at low cost); (2) promoting the use of cover crops for livestock grazing or forage; and (3) developing and promoting location-specific guidelines to facilitate the decision-making process for farmers, seed companies, and implement dealers, but particularly to minimize the yield drag on corn and soybeans, while containing planting and termination costs. An obvious but likely unsustainable alternative (due to federal and state budget constraints) to reduce the net losses derived from cover crop use is to increase the flow of public monies to adopters of the practice through cost-share payments, subsidized seed bags, discounted crop insurance premiums, tax credits, or similar incentives.

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Table 1. Characteristics of operators surveyed

Variable	Mean	Median	Range	#Obs.
Acres of cover crops planted in fall 2015	268	80	[5, 7500]	227
Total number of acres planted to cover crops since starting using cover crops	870	360	[4, 10000]	230
Number of years of experience with cover crops	7.9	6	[1, 45]	233

Table 2. Survey responses by farm size, cover crop species, planting method, termination method, and following cash crop

Farm Characteristic	#Obs.	Percent
Farm Size		
1 to 49 acres	1	0.43
50-99 acres	1	0.43
100-199 acres	14	6.03
200-499 acres	54	23.28
500-999 acres	76	32.76
1000-1999 acres	63	27.16
2000 acres or more	23	9.91
Total	232	100
Cover crop species		
Cereal Rye	164	71.00
Cereal Rye + Oats	11	4.76
Annual Ryegrass	12	5.19
Annual ryegrass + crimson clover + oilseed radish	3	1.30
Annual ryegrass + crimson clover + oilseed radish + rapeseed	2	0.87
Oats + oilseed radish + buckwheat	1	0.43
Oats + oilseed radish + turnip	4	1.73
Other	34	14.72
Total	231	100
Planting method		
Aerial Seeding	40	18.87
Broadcast Seeding	9	4.25
Drilling	161	75.94
Other	2	0.94
Total	212	100
Termination method		
Herbicide	154	66.38
Tillage	36	15.52
Mowing	21	9.05
Winter kill	18	7.76
Other	3	1.29
Total	232	100
Following cash crop		
Corn for grain or seed	135	58.70
Soybeans	87	37.83
Oats for grain	1	0.43
Other	7	3.04
Total	230	100
Hired custom planting of cover crops		
Yes for all	69	30
Yes for some	24	10.43
No	137	59.57
Total	230	100

Table 3. Overall changes in net returns due to cover crop use followed by corn, for all cover crop species, all planting methods, terminated with herbicides.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	22.41	20.00	[5; 80]	39
2. Value of change in following corn yield*	-8.06	0.00	[-108; 80]	69
3. Savings or extra revenue from grazing or harvesting cover crop for forage	35.00	22.00	[3; 100]	9
Subtotal A. Changes in Revenue	***49.35***	***42.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	17.70	16.00	[5; 47]	76
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	14.82	16.15		
i. Custom work	14.39	15.00	[4; 30]	41
ii. Non-Custom	15.14	16.99	[2.42; 25.33]	56
Subtotal B.1	*32.52*	*32.15*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	8.07	0.00		68
i. Extra herbicide cost on top of regular weed control program	0.56	0.00	[0; 17]	68
ii. Extra labor costs to apply herbicides on top of regular weed control program^	5.54	0.00	[0; 130]	68
iii. Other termination expenses	1.97	0.00	[0; 40]	68
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	16.82	15.54		16
i. Herbicide cost to terminate cover crops	9.50	8.00	[4; 24]	16
ii. Herbicide application cost. Weighted average of custom and non-custom work.	7.32	7.54	[3.06; 15.4]	
1. Custom Work	14.20	14.00	[6; 30]	5
2. Non-Custom	5.02	5.38	[2.08; 10.53]	15
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*9.74*	*2.96*		
3. Changes in other costs~				
a. Nitrogen Costs	-0.18	0.00	[-20; 5]	83
b. Manure Costs	-0.09	0.00	[-10; 2.5]	83
c. Insecticide Costs	-0.11	0.00	[-12; 3]	83
d. Fungicide Costs	-0.13	0.00	[-14; 3.5]	83
e. Soil Testing Costs	-0.14	0.00	[-16; 4]	83
f. Costs to Repair Soil Erosion	-0.16	0.00	[-18; 4.5]	83
g. Change in Cash Rent due to Cover Crop Use	-0.68	0.00	[-20; 0]	44
Subtotal B.3	*-1.50*	*0.00*		
Subtotal B. Changes in Costs	***40.76***	***35.11***		
C. Net Change in Profits (C=A-B)	***8.59***	***6.89***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-26.41***	***-15.11***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -27 to 20 bushels per acre, with an average loss of 2 bushels. The median farmer reported no change in corn yields.
^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 10 hours, and averaged 0.43 hours. The median farmer reported no extra labor to terminate cover crops .
~ No respondent indicated changes in cash crop seed costs, cash crop planting costs (excluding seeds), P and K costs, or management time due to cover crops use.

Table 4. Overall changes in net returns due to cover crop use followed by soybeans, for all cover crop species, all planting methods, terminated with herbicides.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	20.13	15.00	[7; 46]	23
2. Value of change in following soybean yield*	-1.07	0.00	[-100; 50]	56
3. Savings or extra revenue from grazing or harvesting cover crop for forage	32.54	20.00	[2; 150]	13
Subtotal A. Changes in Revenue	***51.60***	***35.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	16.34	15.00	[2; 50]	50
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	16.47	16.95		
i. Custom work	16.52	16.00	[6; 32]	21
ii. Non-Custom	16.45	17.47	[3.59; 24.17]	38
Subtotal B.1	*32.81*	*31.95*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)^	2.63	0.00		49
i. Extra herbicide cost on top of regular weed control program	0.29	0.00	[-11; 12]	49
ii. Extra labor costs to apply herbicides on top of regular weed control program	1.33	0.00	[0; 39]	49
iii. Other termination expenses	1.02	0.00	[0; 20]	49
b. Extra expenses for farmers that did not apply herbicides before planting soybean in acres without cover crops.	18.54	14.55		9
i. Herbicide cost to terminate cover crops	11.56	10.00	[2; 30]	9
ii. Herbicide application cost. Weighted average of custom and non-custom work.	6.99	4.55	[4.16; 13.53]	
1. Custom Work	13.67	8.00	[8; 25]	3
2. Non-Custom	4.48	3.25	[2.72; 9.23]	8
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*5.10*	*2.26*		
3. Changes in other costs˜				
a. Cash crop seed costs	-0.18	0.00	[-11; 0]	61
b. Costs to Repair Soil Erosion	-0.02	0.00	[-1; 0]	61
c. Change in Cash Rent due to Cover Crop Use	-0.37	0.00	[-10; 0]	27
Subtotal B.3	*-0.57*	*0.00*		
Subtotal B. Changes in Costs	***37.34***	***34.21***		
C. Net Change in Profits (C=A-B)	***14.25***	***0.79***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-18.29***	***-19.21***		

* Reported changes in soybean yields following cover crops due to cover crops use ranged from -10 to 5 bushels per acre, with an average loss of 0.11 bushels. The median farmer reported no change in soybean yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 3 hours, and averaged 0.10 hours. The median farmer reported no extra labor to terminate cover crops.

˜ No respondent indicated changes in soybean planting costs (excluding seeds); N, P or K costs; manure, insecticide, fungicide, or soil testing costs; or management time due to cover crops use.

Table 5. Changes in net returns due to cover crop use followed by corn, for all cover crop species, all planting methods, terminated with herbicides. Farmers with up to 3 years of experience with cover crops.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	20.83	20.00	[15; 30]	6
2. Value of change in following corn yield*	-20.00	-20.00	[-60; 0]	9
3. Savings or extra revenue from grazing or harvesting cover crop for forage	80.00	80.00	[80; 80]	1
Subtotal A. Changes in Revenue	***80.83***	***80.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	15.60	15.00	[8; 30]	10
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	15.09	14.20		
i. Custom work	18.50	15.50	[13; 30]	4
ii. Non-Custom	13.14	13.46	[9.79; 15.82]	7
Subtotal B.1	*30.69*	*29.20*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	5.00	0.00		7
i. Extra herbicide cost on top of regular weed control program	0.00	0.00	[0; 0]	7
ii. Extra labor costs to apply herbicides on top of regular weed control program	0.00	0.00	[0; 0]	7
iii. Other termination expenses	5.00	0.00	[0; 20]	7
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	15.17	15.54		2
i. Herbicide cost to terminate cover crops	8.00	8.00	[8; 8]	2
ii. Herbicide application cost. Weighted average of custom and non-custom work.	7.17	7.54	[5.06; 8.91]	
1. Custom Work	14.00	14.00	[14; 14]	1
2. Non-Custom	4.89	5.38	[2.08; 7.21]	3
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*7.26*	*3.45*		
3. Changes in other costs˜				
a. Nitrogen Costs	0.00	0.00	[0; 0]	11
b. Change in Cash Rent due to Cover Crop Use	0.00	0.00	[0; 0]	4
Subtotal B.3	*0.00*	*0.00*		
Subtotal B. Changes in Costs	***37.95***	***32.65***		
C. Net Change in Profits (C=A-B)	***42.88***	***47.35***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-37.12***	***-32.65***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -15 to 0 bushels per acre, with an average and median loss of 5 bushels.

˜ No respondent indicated changes in corn planting costs; N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time due to cover crops use.

Table 6. Changes in net returns due to cover crop use followed by corn, for all cover crop species, all planting methods, terminated with herbicides. Farmers with 4 to 9 years of experience with cover crops.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	24.60	20.00	[7; 80]	20
2. Value of change in following corn yield*	-0.41	0.00	[-32; 28]	29
3. Savings or extra revenue from grazing or harvesting cover crop for forage	35.00	20.00	[10; 100]	5
Subtotal A. Changes in Revenue	***59.19***	***40.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	16.85	16.00	[9; 25]	41
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	14.56	16.11		
i. Custom work	13.92	15.00	[5; 25]	24
ii. Non-Custom	15.07	16.99	[2.42; 25.33]	30
Subtotal B.1	*31.41*	*32.11*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	10.79	0.00		34
i. Extra herbicide cost on top of regular weed control program	0.97	0.00	[0; 17]	34
ii. Extra labor costs to apply herbicides on top of regular weed control program^	7.65	0.00	[0; 130]	34
iii. Other termination expenses	2.18	0.00	[0; 40]	34
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	17.42	14.82		11
i. Herbicide cost to terminate cover crops	9.27	8.00	[4; 24]	11
ii. Herbicide application cost. Weighted average of custom and non-custom work.	8.15	6.82	[3.79; 15.4]	
1. Custom Work	17.00	14.00	[7; 30]	3
2. Non-Custom	5.20	4.42	[2.72; 10.53]	9
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*12.41*	*3.62*		
3. Changes in other costs~				
a. Nitrogen Costs	0.11	0.00	[0; 5]	47
b. Change in Cash Rent due to Cover Crop Use	-1.15	0.00	[-20; 0]	26
Subtotal B.3	*-1.05*	*0.00*		
Subtotal B. Changes in Costs	***42.78***	***35.73***		
C. Net Change in Profits (C=A-B)	***16.41***	***4.27***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-18.59***	***-15.73***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -8 to 7 bushels per acre, with an average loss of 0.1 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 10 hours, and averaged 0.59 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in corn planting costs; P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time due to cover crops use.

Table 7. Changes in net returns due to cover crop use followed by corn, for all cover crop species, all planting methods, terminated with herbicides. Farmers with 10 or more years of experience with cover crops.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	17.00	16.00	[10; 25]	3
2. Value of change in following corn yield*	2.00	0.00	[0; 16]	8
3. Savings or extra revenue from grazing or harvesting cover crop for forage	28.50	28.50	[22; 35]	2
Subtotal A. Changes in Revenue	***47.50***	***44.50***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	16.75	15.50	[10; 28]	8
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	15.12	17.21		
i. Custom work	13.33	15.00	[10; 15]	3
ii. Non-Custom	15.71	17.95	[3.59; 19.29]	9
Subtotal B.1	*31.87*	*32.71*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	1.55	0.00		11
i. Extra herbicide cost on top of regular weed control program	0.00	0.00	[0; 0]	11
ii. Extra labor costs to apply herbicides on top of regular weed control program^	1.18	0.00	[0; 13]	11
iii. Other termination expenses	0.36	0.00	[0; 4]	11
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	8.25	8.25		1
i. Herbicide cost to terminate cover crops	4.00	4.00	[4; 4]	1
ii. Herbicide application cost. Weighted average of custom and non-custom work.	4.25	4.25	[3.12; 5.38]	
1. Custom Work	0.00	0.00	[0; 0]	0
2. Non-Custom	4.25	4.25	[3.12; 5.38]	2
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*2.10*	*0.69*		
3. Changes in other costs~				
a. Nitrogen Costs	0.00	0.00	[0; 0]	13
b. Change in Cash Rent due to Cover Crop Use	0.00	0.00	[0; 0]	4
Subtotal B.3	*0.00*	*0.00*		
Subtotal B. Changes in Costs	***33.97***	***33.40***		
C. Net Change in Profits (C=A-B)	***13.53***	***11.10***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-14.97***	***-17.40***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from 0 to 4 bushels per acre, with an average increase of 0.5 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hour, and averaged 0.09 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in corn planting costs; N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time or cash rent paid due to cover crops use.

Table 8. Changes in net returns due to cover crop use followed by soybeans, for all cover crop species, all planting methods, terminated with herbicides. Farmers with up to 3 years of experience with cover crops.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	15.00	15.00	[15; 15]	4
2. Value of change in following soybean yield*	4.29	0.00	[-40; 50]	7
3. Savings or extra revenue from grazing or harvesting cover crop for forage	31.00	31.00	[31; 31]	1
Subtotal A. Changes in Revenue	***50.29***	***46.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	14.17	15.00	[10; 17]	6
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	15.99	15.74		
i. Custom work	15.33	15.00	[15; 16]	3
ii. Non-Custom	17.95	17.95	[17.95; 17.95]	1
Subtotal B.1	*30.16*	*30.74*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)^	6.60	0.00		5
i. Extra herbicide cost on top of regular weed control program	0.00	0.00	[0; 0]	5
ii. Extra labor costs to apply herbicides on top of regular weed control program	2.60	0.00	[0; 13]	5
iii. Other termination expenses	4.00	0.00	[0; 20]	5
b. Extra expenses for farmers that did not apply herbicides before planting soybean in acres without cover crops.	24.96	25.63		3
i. Herbicide cost to terminate cover crops	19.33	20.00	[8; 30]	3
ii. Herbicide application cost. Weighted average of custom and non-custom work.	5.63	5.63	[5.63; 5.63]	
1. Custom Work	8.00	8.00	[8; 8]	2
2. Non-Custom	3.25	3.25	[3.25; 3.25]	2
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*13.48*	*9.61*		
3. Changes in other costs~				
a. Cash crop seed costs	0.00	0.00	[0; 0]	8
b. Change in Cash Rent due to Cover Crop Use	0.00	0.00	[0; 0]	3
Subtotal B.3	*0.00*	*0.00*		
Subtotal B. Changes in Costs	***43.64***	***40.35***		
C. Net Change in Profits (C=A-B)	***6.64***	***5.65***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-24.36***	***-25.35***		

* Reported changes in soybean yields following cover crops due to cover crops use ranged from -5 to 4 bushels per acre, with an average increase of 0.43 bushels. The median farmer reported no change in soybean yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.20 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in corn planting costs; N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time or cash rent paid due to cover crops use.

Table 9. Changes in net returns due to cover crop use followed by soybeans, for all cover crop species, all planting methods, terminated with herbicides. Farmers with 4 to 9 years of experience with cover crops.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	22.63	15.00	[10; 46]	8
2. Value of change in following soybean yield*	2.50	0.00	[-70; 40]	20
3. Savings or extra revenue from grazing or harvesting cover crop for forage	30.71	20.00	[5; 83]	7
Subtotal A. Changes in Revenue	***55.84***	***35.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	18.00	14.00	[8; 50]	23
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	18.04	16.76		
i. Custom work	17.50	16.00	[6; 32]	10
ii. Non-Custom	19.84	19.29	[17.95; 22.29]	3
Subtotal B.1	*36.04*	*30.76*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)^	0.95	0.00		22
i. Extra herbicide cost on top of regular weed control program	0.41	0.00	[-11; 12]	22
ii. Extra labor costs to apply herbicides on top of regular weed control program	0.00	0.00	[0; 0]	22
iii. Other termination expenses	0.55	0.00	[0; 12]	22
b. Extra expenses for farmers that did not apply herbicides before planting soybean in acres without cover crops.	14.00	14.06		2
i. Herbicide cost to terminate cover crops	8.00	8.00	[6; 10]	2
ii. Herbicide application cost. Weighted average of custom and non-custom work.	6.00	6.06	[2.72; 9.23]	
1. Custom Work	0.00	0.00	[0; 0]	0
2. Non-Custom	6.00	6.06	[2.72; 9.23]	3
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*2.04*	*1.17*		
3. Changes in other costs˜				
a. Cash crop seed costs	-0.42	0.00	[-11; 0]	26
b. Change in Cash Rent due to Cover Crop Use	-0.83	0.00	[-10; 0]	12
Subtotal B.3	*-1.26*	*0.00*		
Subtotal B. Changes in Costs	***36.83***	***31.93***		
C. Net Change in Profits (C=A-B)	***19.01***	***3.07***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-11.70***	***-16.93***		

* Reported changes in soybean yields following cover crops due to cover crops use ranged from -5 to 4 bushels per acre, with an average increase of 0.43 bushels. The median farmer reported no change in soybean yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.20 hours. The median farmer reported no extra labor to terminate cover crops.

˜ No respondent indicated changes in corn planting costs; N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time or cash rent paid due to cover crops use.

Table 10. Changes in net returns due to cover crop use followed by soybeans, for all cover crop species, all planting methods, terminated with herbicides. Farmers with 10 or more years of experience with cover crops.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	15.75	15.00	[8; 25]	4
2. Value of change in following soybean yield*	-0.91	0.00	[-50; 40]	11
3. Savings or extra revenue from grazing or harvesting cover crop for forage	43.75	10.00	[5; 150]	4
Subtotal A. Changes in Revenue	***58.59***	***25.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	16.33	14.50	[10; 30]	12
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	16.22	16.12		
i. Custom work	17.67	15.00	[10; 28]	3
ii. Non-Custom	15.86	16.41	[7.91; 21.93]	12
Subtotal B.1	*32.55*	*30.62*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)^	2.17	0.00		12
i. Extra herbicide cost on top of regular weed control program	0.25	0.00	[0; 3]	12
ii. Extra labor costs to apply herbicides on top of regular weed control program	1.08	0.00	[0; 13]	12
iii. Other termination expenses	0.83	0.00	[0; 10]	12
b. Extra expenses for farmers that did not apply herbicides before planting soybean in acres without cover crops.	10.32	10.32		2
i. Herbicide cost to terminate cover crops	6.00	6.00	[2; 10]	2
ii. Herbicide application cost. Weighted average of custom and non-custom work.	4.32	4.32	[3.25; 5.38]	
1. Custom Work	0.00	0.00	[0; 0]	0
2. Non-Custom	4.32	4.32	[3.25; 5.38]	2
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*3.33*	*1.47*		
3. Changes in other costs~				
a. Cash crop seed costs	0.00	0.00	[0; 0]	14
b. Change in Cash Rent due to Cover Crop Use	0.00	0.00	[0; 0]	5
Subtotal B.3	*0.00*	*0.00*		
Subtotal B. Changes in Costs	***35.88***	***32.09***		
C. Net Change in Profits (C=A-B)	***22.71***	***-7.09***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-21.04***	***-17.09***		

* Reported changes in soybean yields following cover crops due to cover crops use ranged from -5 to 4 bushels per acre, with an average loss of -0.09 bushels. The median farmer reported no change in soybean yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.08 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in corn planting costs; N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time or cash rent paid due to cover crops use.

Table 11. Changes in net returns due to cereal rye use followed by corn, for all planting methods, terminated with herbicides. Operations in rotational or continuous no-till only.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	24.69	20.00	[10; 80]	13
2. Value of change in following corn yield*	-14.17	0.00	[-108; 28]	35
3. Savings or extra revenue from grazing or harvesting cover crop for forage	17.33	20.00	[10; 22]	3
Subtotal A. Changes in Revenue	***27.85***	***40.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	17.03	15.00	[8; 30]	32
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	15.12	16.07		
i. Custom work	15.16	15.00	[5; 30]	19
ii. Non-Custom	15.08	16.99	[2.42; 25.33]	22
Subtotal B.1	*32.15*	*31.07*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	5.31	0.00		26
i. Extra herbicide cost on top of regular weed control program	0.69	0.00	[0; 17]	26
ii. Extra labor costs to apply herbicides on top of regular weed control program^	1.50	0.00	[0; 13]	26
iii. Other termination expenses	3.12	0.00	[0; 40]	26
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	17.59	15.98		8
i. Herbicide cost to terminate cover crops	8.63	6.50	[4; 24]	8
ii. Herbicide application cost. Weighted average of custom and non-custom work.	8.97	9.48	[7.27; 11.01]	
1. Custom Work	30.00	30.00	[30; 30]	1
2. Non-Custom	4.76	5.38	[2.72; 7.21]	5
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*8.20*	*3.76*		
3. Changes in other costs~				
a. Nitrogen Costs	0.00	0.00	[0; 0]	35
b. Change in Cash Rent due to Cover Crop Use	-1.11	0.00	[-20; 0]	18
Subtotal B.3	*-1.11*	*0.00*		
Subtotal B. Changes in Costs	***39.24***	***34.83***		
C. Net Change in Profits (C=A-B)	***-11.38***	***5.17***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-28.72***	***-14.83***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -28 to 7 bushels per acre, with an average loss of 3.54 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.12 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in corn planting costs (including seeds); N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time due to cover crops use.

Table 12. Changes in net returns due to cereal rye use followed by corn, for all planting methods, terminated with herbicides. Operations in reduced-till only.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	29.00	27.00	[15; 45]	3
2. Value of change in following corn yield*	4.57	0.00	[-8; 40]	7
3. Savings or extra revenue from grazing or harvesting cover crop for forage	0.00	0.00	[0; 0]	0
Subtotal A. Changes in Revenue	***33.57***	***27.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	18.17	19.00	[9; 25]	6
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	12.94	13.38		
i. Custom work	11.33	12.00	[10; 12]	3
ii. Non-Custom	14.15	14.42	[9.79; 17.95]	4
Subtotal B.1	*31.11*	*32.38*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	2.80	0.00		5
i. Extra herbicide cost on top of regular weed control program	0.00	0.00	[0; 0]	5
ii. Extra labor costs to apply herbicides on top of regular weed control program^	2.60	0.00	[0; 13]	5
iii. Other termination expenses	0.20	0.00	[0; 1]	5
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	8.84	8.84		1
i. Herbicide cost to terminate cover crops	4.00	4.00	[4; 4]	1
ii. Herbicide application cost. Weighted average of custom and non-custom work.	4.84	4.84	[4.29; 5.38]	
1. Custom Work	0.00	0.00	[0; 0]	0
2. Non-Custom	4.84	4.84	[4.29; 5.38]	2
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*3.81*	*1.47*		
3. Changes in other costs~				
a. Nitrogen Costs	0.00	0.00	[0; 0]	7
b. Change in Cash Rent due to Cover Crop Use	0.00	0.00	[0; 0]	3
Subtotal B.3	*0.00*	*0.00*		
Subtotal B. Changes in Costs	***34.91***	***33.85***		
C. Net Change in Profits (C=A-B)	***-1.34***	***-6.85***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-1.34***	***-6.85***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -2 to 10 bushels per acre, with an average loss of 1.14 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.20 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in corn planting costs (including seeds); N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time due to cover crops use.

Table 13. Changes in net returns due to cereal rye use followed by corn, for all planting methods, terminated with herbicides. Operations in conventional- or vertical-tillage only.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	19.00	17.50	[7; 35]	6
2. Value of change in following corn yield*	-7.20	0.00	[-40; 0]	10
3. Savings or extra revenue from grazing or harvesting cover crop for forage	70.00	80.00	[30; 100]	3
Subtotal A. Changes in Revenue	***81.80***	***97.50***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	15.88	17.00	[10; 21]	8
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	14.04	14.10		
i. Custom work	14.20	15.00	[8; 20]	5
ii. Non-Custom	13.93	13.46	[7.55; 19.38]	7
Subtotal B.1	*29.92*	*31.10*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	44.50	14.50		6
i. Extra herbicide cost on top of regular weed control program	2.50	0.00	[0; 10]	6
ii. Extra labor costs to apply herbicides on top of regular weed control program^	36.83	13.00	[0; 130]	6
iii. Other termination expenses	5.17	1.50	[0; 20]	6
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	17.40	16.16		4
i. Herbicide cost to terminate cover crops	10.25	10.00	[6; 15]	4
ii. Herbicide application cost. Weighted average of custom and non-custom work.	7.15	6.16	[5.06; 11.52]	
1. Custom Work	10.50	10.50	[7; 14]	2
2. Non-Custom	5.81	4.42	[4.29; 10.53]	5
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*33.66*	*15.16*		
3. Changes in other costs~				
a. Nitrogen Costs	0.45	0.00	[0; 5]	11
b. Change in Cash Rent due to Cover Crop Use	-2.00	0.00	[-10; 0]	5
Subtotal B.3	*0.00*	*0.00*		
Subtotal B. Changes in Costs	***34.91***	***33.85***		
C. Net Change in Profits (C=A-B)	***-1.34***	***-6.85***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-1.34***	***-6.85***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -10 to 0 bushels per acre, with an average loss of 1.80 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 10 hours, and averaged 2.83 hours. The median farmer reported 1 extra labor hour to terminate cover crops.

~ No respondent indicated changes in corn planting costs (including seeds); P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time due to cover crops use.

Table 14. Changes in net returns due to cover crops use followed by corn, for all cover crop species, terminated with herbicides, in no-till systems. Planting method: drilling.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	27.10	20.50	[15; 80]	10
2. Value of change in following corn yield*	-13.55	0.00	[-108; 28]	31
3. Savings or extra revenue from grazing or harvesting cover crop for forage	13.33	10.00	[10; 20]	3
Subtotal A. Changes in Revenue	***26.88***	***30.50***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	18.03	17.00	[5; 35]	35
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	15.94	16.28		
i. Custom work	16.00	15.00	[5; 30]	16
ii. Non-Custom	15.90	16.99	[7.86; 25.33]	29
Subtotal B.1	*33.97*	*33.28*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	4.90	0.00		29
i. Extra herbicide cost on top of regular weed control program	0.79	0.00	[0; 17]	29
ii. Extra labor costs to apply herbicides on top of regular weed control program^	0.90	0.00	[0; 13]	29
iii. Other termination expenses	3.21	0.00	[0; 40]	29
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	20.54	18.27		8
i. Herbicide cost to terminate cover crops	11.25	9.00	[5; 24]	8
ii. Herbicide application cost. Weighted average of custom and non-custom work.	9.29	9.27	[3.81; 14.81]	
1. Custom Work	18.00	18.00	[6; 30]	2
2. Non-Custom	4.93	4.90	[2.72; 7.21]	4
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*8.28*	*3.95*		
3. Changes in other costs~				
a. Nitrogen Costs	-0.54	0.00	[-20; 0]	37
b. Costs to Repair Soil Erosion	-0.11	0.00	[-4; 0]	37
c. Change in Cash Rent due to Cover Crop Use	-1.05	0.00	[-20; 0]	19
Subtotal B.3	*-1.70*	*0.00*		
Subtotal B. Changes in Costs	***40.55***	***37.23***		
C. Net Change in Profits (C=A-B)	***-13.66***	***-6.73***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-26.99***	***-16.73***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -27 to 7 bushels per acre, with an average loss of 3.39 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.07 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in cash crop planting costs (including seeds); P, K, manure, insecticide, fungicide, or soil testing costs; or changes in management time due to cover crops use.

Table 15. Changes in net returns due to cover crops use followed by corn, for all cover crop species, terminated with herbicides, in no-till systems. Planting method: aerial.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	19.20	16.00	[5; 45]	5
2. Value of change in following corn yield*	-11.14	0.00	[-100; 4]	14
3. Savings or extra revenue from grazing or harvesting cover crop for forage	15.00	20.00	[3; 22]	3
Subtotal A. Changes in Revenue	***23.06***	***36.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	19.31	20.00	[10; 26]	13
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	16.00	15.61		
i. Custom work	16.33	15.00	[10; 25]	15
ii. Non-Custom	15.01	17.44	[3.59; 25.33]	5
Subtotal B.1	*35.31*	*35.61*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	5.45	0.00		11
i. Extra herbicide cost on top of regular weed control program	0.00	0.00	[0; 0]	11
ii. Extra labor costs to apply herbicides on top of regular weed control program^	2.36	0.00	[0; 13]	11
iii. Other termination expenses	3.09	0.00	[0; 15]	11
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	13.97	14.42		3
i. Herbicide cost to terminate cover crops	9.67	10.00	[4; 15]	3
ii. Herbicide application cost. Weighted average of custom and non-custom work.	4.31	4.42	[3.12; 5.38]	
1. Custom Work	0.00	0.00	[0; 0]	0
2. Non-Custom	4.31	4.42	[3.12; 5.38]	3
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*7.28*	*3.09*		
3. Changes in other costs~				
a. Nitrogen Costs	0.00	0.00	[0; 0]	15
b. Costs to Repair Soil Erosion	0.00	0.00	[0; 0]	15
c. Change in Cash Rent due to Cover Crop Use	0.00	0.00	[0; 0]	6
Subtotal B.3	*0.00*	*0.00*		
Subtotal B. Changes in Costs	***42.59***	***38.70***		
C. Net Change in Profits (C=A-B)	***-19.53***	***-2.70***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-34.53***	***-22.70***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -25 to 1 bushels per acre, with an average loss of 2.79 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.18 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in cash crop planting costs (including seeds); N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time or cash rent paid due to cover crops use.

Table 16. Changes in net returns due to cover crop use followed by soybeans, for all cover crop species, terminated with herbicides, in no-till systems. Planting method: drilling.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	16.70	15.00	[7; 38]	10
2. Value of change in following soybean yield*	2.80	0.00	[-20; 40]	25
3. Savings or extra revenue from grazing or harvesting cover crop for forage	15.00	17.00	[2; 31]	7
Subtotal A. Changes in Revenue	***34.50***	***32.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	16.67	13.50	[6; 32]	24
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	17.82	18.53		
i. Custom work	21.50	22.00	[10; 32]	4
ii. Non-Custom	17.21	17.95	[8.34; 24.17]	24
Subtotal B.1	*34.49*	*32.03*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)^	2.43	0.00		23
i. Extra herbicide cost on top of regular weed control program	0.00	0.00	[-11; 8]	23
ii. Extra labor costs to apply herbicides on top of regular weed control program	1.13	0.00	[0; 13]	23
iii. Other termination expenses	1.30	0.00	[0; 20]	23
b. Extra expenses for farmers that did not apply herbicides before planting soybean in acres without cover crops.	13.99	14.66		3
i. Herbicide cost to terminate cover crops	9.33	10.00	[8; 10]	3
ii. Herbicide application cost. Weighted average of custom and non-custom work.	4.66	4.66	[4.48; 4.83]	
1. Custom Work	8.00	8.00	[8; 8]	1
2. Non-Custom	2.99	2.99	[2.72; 3.25]	2
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*3.77*	*1.69*		
3. Changes in other costs~				
a. Costs to Repair Soil Erosion	-0.04	0.00	[-1; 0]	26
b. Change in Cash Rent due to Cover Crop Use	-0.77	0.00	[-10; 0]	13
Subtotal B.3	*-0.81*	*0.00*		
Subtotal B. Changes in Costs	***37.45***	***33.72***		
C. Net Change in Profits (C=A-B)	***-2.95***	***-1.72***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-17.95***	***-18.72***		

* Reported changes in soybean yields following cover crops due to cover crops use ranged from -2 to 4 bushels per acre, with an average increase of 0.28 bushels. The median farmer reported no change in soybean yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.09 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in soybean planting costs (including seeds); N, P or K costs; manure, insecticide, fungicide, or soil testing costs; or management time due to cover crops use.

Table 17. Changes in net returns due to cover crop use followed by soybeans, for all cover crop species, terminated with herbicides, in no-till systems. Planting method: aerial.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	18.55	15.00	[10; 35]	11
2. Value of change in following soybean yield*	5.00	0.00	[-60; 40]	14
3. Savings or extra revenue from grazing or harvesting cover crop for forage	15.00	10.00	[5; 30]	3
Subtotal A. Changes in Revenue	***38.55***	***25.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	18.06	15.00	[10; 32]	16
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	18.18	15.73		
i. Custom work	19.46	16.00	[12; 35]	13
ii. Non-Custom	14.00	14.86	[8.34; 17.95]	4
Subtotal B.1	*36.24*	*30.73*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)^	1.53	0.00		15
i. Extra herbicide cost on top of regular weed control program	0.00	0.00	[0; 0]	15
ii. Extra labor costs to apply herbicides on top of regular weed control program	0.87	0.00	[0; 13]	15
iii. Other termination expenses	0.67	0.00	[0; 10]	15
b. Extra expenses for farmers that did not apply herbicides before planting soybean in acres without cover crops.	12.99	12.99		2
i. Herbicide cost to terminate cover crops	10.00	10.00	[10; 10]	2
ii. Herbicide application cost. Weighted average of custom and non-custom work.	2.99	2.99	[2.72; 3.25]	
1. Custom Work	0.00	0.00	[0; 0]	0
2. Non-Custom	2.99	2.99	[2.72; 3.25]	2
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*2.88*	*1.53*		
3. Changes in other costs˜				
a. Costs to Repair Soil Erosion	0.00	0.00	[0; 0]	17
b. Change in Cash Rent due to Cover Crop Use	0.00	0.00	[0; 0]	8
Subtotal B.3	*0.00*	*0.00*		
Subtotal B. Changes in Costs	***39.12***	***32.26***		
C. Net Change in Profits (C=A-B)	***-0.58***	***-7.26***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-15.58***	***-17.26***		

* Reported changes in soybean yields following cover crops due to cover crops use ranged from -6 to 4 bushels per acre, with an average increase of 0.50 bushels. The median farmer reported no change in soybean yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.07 hours. The median farmer reported no extra labor to terminate cover crops.

˜ No respondent indicated changes in soybean planting costs (including seeds); N, P or K costs; manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time or cash rent paid due to cover crops use.

Table 18. Changes in net returns due to cover crops use followed by corn, for all cover crop species, planted with drills in conventional or vertical tillage systems. Termination method: herbicides.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	16.75	16.00	[7; 28]	4
2. Value of change in following corn yield*	-8.00	0.00	[-40; 0]	5
3. Savings or extra revenue from grazing or harvesting cover crop for forage	80.00	80.00	[80; 80]	1
Subtotal A. Changes in Revenue	***88.75***	***96.00***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	17.40	19.00	[10; 21]	5
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	14.50	14.50		
i. Custom work	14.33	15.00	[13; 15]	3
ii. Non-Custom	14.57	14.28	[9.79; 19.38]	7
Subtotal B.1	*31.90*	*33.50*		
2. Cover Crop Termination				
a. Extra expenses for farmers that applied herbicides to all acres (with and without cover crops)	13.25	0.00		4
i. Extra herbicide cost on top of regular weed control program	0.00	0.00	[0; 0]	4
ii. Extra labor costs to apply herbicides on top of regular weed control program^	3.25	0.00	[0; 13]	4
iii. Other termination expenses	10.00	0.00	[0; 20]	4
b. Extra expenses for farmers that did not apply herbicides before planting corn in acres without cover crops.	15.26	15.54		1
i. Herbicide cost to terminate cover crops	8.00	8.00	[8; 8]	1
ii. Herbicide application cost. Weighted average of custom and non-custom work.	7.26	7.54	[6.72; 7.54]	
1. Custom Work	14.00	14.00	[14; 14]	1
2. Non-Custom	5.02	5.38	[4.29; 5.38]	3
Subtotal B.2 (weighted average of B.2.a and B.2.b)	*13.65*	*3.11*		
3. Changes in other costs~				
Subtotal B.3	*0.00*	*0.00*	[0; 0]	8
Subtotal B. Changes in Costs	***45.55***	***36.61***		
C. Net Change in Profits (C=A-B)	***43.20***	***59.39***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-36.80***	***-20.61***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from -10 to 0 bushels per acre, with an average loss of 2.00 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.25 hours. The median farmer reported no extra labor to terminate cover crops.

~ No respondent indicated changes in cash crop planting costs (including seeds); N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in management time or cash rent paid due to cover crops use.

Table 19. Changes in net returns due to cover crops use followed by corn, for all cover crop species, terminated with herbicides, in conventional or vertical tillage systems. Termination method: tillage.

Sources of changes in net profits	Mean	Median	Range	#Obs.
	$/acre			
A) Changes in Revenues				
1. Cost-share program	15.50	15.50	[11; 20]	2
2. Value of change in following corn yield*	9.00	0.00	[0; 52]	8
3. Savings or extra revenue from grazing or harvesting cover crop for forage	41.00	20.00	[15; 88]	3
Subtotal A. Changes in Revenue	***65.50***	***35.50***		
B) Changes in Costs				
1. Cover Crop Planting				
a. Seeds	20.20	16.50	[5; 45]	10
b. Planting (excluding seeds). Weighted average of custom and non-custom work.	13.54	12.01		
i. Custom work	27.00	27.00	[27; 27]	1
ii. Non-Custom	12.04	10.34	[7.59; 18.61]	9
Subtotal B.1	*33.74*	*28.51*		
2. Cover Crop Termination				
a. Extra expenses for farmers that used conventional till in all acres (with and without cover crops)	4.90	0.00		10
i. Extra labor costs to till cover crop acres on top of regular costs to till no cover crop acres^	3.90	0.00	[0; 13]	10
ii. Other termination expenses	1.00	0.00	[0; 5]	10
Subtotal B.2	*4.90*	*0.00*		
3. Changes in other costs˜				
a. Opportunity cost of management time~	0.30	0.00	[0; 30]	10
Subtotal B.3	*0.30*	*0.00*		
Subtotal B. Changes in Costs	***38.34***	***28.51***		
C. Net Change in Profits (C=A-B)	***26.56***	***6.99***		
C.1. Net Change in Profits excluding grazing/forage (C.1 = C - A.3)	***-14.44***	***-13.01***		

* Reported changes in corn yields following cover crops due to cover crops use ranged from 0 to 13 bushels per acre, with an average gain of 2.25 bushels. The median farmer reported no change in corn yields.

^ Reported changes in labor hours per acre to terminate cover crops with herbicides ranged from 0 to 1 hours, and averaged 0.30 hours. The median farmer reported no extra labor to terminate cover crops.

˜ No respondent indicated changes in cash crop planting costs (including seeds); N, P, K, manure, insecticide, fungicide, or soil testing costs; or changes in costs to repair soil erosion; or changes in cash rent paid due to cover crops use. Only one operator reported 2 extra management hours required per acre per year to manage cover crops.

Figure 1. Percent of respondents who planted cover crops in 2015 by agricultural district